

**METHOD AND APPARATUS FOR MOTION TRACKING OF AN
ARTICULATED RIGID BODY**

ABSTRACT OF THE DISCLOSURE

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One embodiment the invention comprises a method of determining an orientation of a sensor. The method includes measuring a local magnetic field vector and a local gravity vector and using those measurements to determine the orientation of the sensor. Embodiments can include measuring the magnetic field vector and the
10 local gravity vector using quaternion coordinates.

Another embodiment comprises measuring a local magnetic field vector, a local gravity vector, and the angular velocity of the sensor. These three vectors are processed to determine the orientation of the sensor. In one embodiment the three vectors can all be measured in quaternion coordinates.

15 Another method embodiment comprises determining a local gravity vector by providing a acceleration detector, moving the detector from a start point to an end point over a time period, and summing acceleration measurements over the time period. The local gravity vector is calculated using the summed acceleration measurements.

20 A system embodiment of the present invention includes a body having mounted thereon at least one sensor. The at least one sensor is configured to output orientation information to at least one processing unit that inputs the orientation information into a synthetic environment. The system also can include a display for displaying the orientation of the body with respect to the synthetic environment.